

**BEFORE THE
PUBLIC SERVICE COMMISSION
OF WISCONSIN**

Joint Application of Wisconsin Power and Light
Company and Wisconsin Electric Power
Company for Certificate of Authority for
Edgewater Generating Station Unit 5 NOx
Reduction Project

Docket No. 5-CE-197

**PRE-FILED DIRECT TESTIMONY OF
Eric J. Guelker
FOR
WISCONSIN POWER AND LIGHT COMPANY**

October 20, 2009

1 **Q. Please state your name and business address.**

2 A. My name is Eric J. Guelker and my business address is 4902 North Biltmore
3 Lane, P.O. Box 77007, Madison, Wisconsin 53707-1007.

4 **Q. By whom are you employed and in what capacity?**

5 A. I am employed by Alliant Energy Corporate Services, Inc. (AECS) as Manager –
6 Environmental Services. In this capacity, I oversee and perform planning
7 activities associated with Wisconsin Power and Light Company's (WPL or
8 Company) current and future power plant air emissions.

9 **Q. Please state your educational background.**

10 A. I received a B.S. Degree in Electrical Engineering from the University of
11 Wisconsin – Madison in December 1990. I also received an Executive Masters of

1 Business Administration degree from the University of Wisconsin – Madison in
2 May 2001.

3 **Q. Please describe your work experience.**

4 A. I was employed by Wisconsin Power and Light Company (WPL) from January
5 1990 through August 1994 working primarily in Generation Planning and Bulk
6 Power Marketing. From September 1994 through May 1998, I was employed by
7 Goldman, Sachs, and Co. as a natural gas trader. I was employed by AECS in
8 May 1998 as a Lead Energy Portfolio Management Engineer, worked as Manager
9 - Bulk Power for AECS from March 1999 until November 2005, and became
10 Manager – Environmental Services in November 2005.

11 **Q. Have you testified in previous regulatory proceedings before the Public**
12 **Service Commission of Wisconsin (PSCW)?**

13 A. Yes. Those proceedings included three general rate cases and three proceedings
14 for rate increases due to extraordinary increases in fuel costs on behalf of WPL.
15 In those proceedings, my testimony addressed electric capacity and energy
16 procurement, contracting practices, and pricing as well as management of and
17 decision-making related to the Company's overall electricity supply portfolio. I
18 also testified in the proceeding addressing the proposed Nelson Dewey
19 Generating Station Unit 3 regarding various matters related to greenhouse gas
20 emissions and in the Columbia 1 and 2 proceeding to install SO₂ and mercury
21 emission reduction systems regarding the need for these systems.

22 **Q. What is the purpose of your testimony?**

1 A. The purpose of my testimony is to discuss the need to install air emissions
2 controls on Edgewater Generating Station Unit 5 (“Edgewater Unit 5”) in
3 Sheboygan County, Wisconsin to reduce Nitrogen Oxides (NOx) emissions.
4 First, I will examine the compliance requirements and approaches associated with
5 Reasonably Available Control Technology (RACT) as set forth in the Wisconsin
6 Administrative Code, Chapter NR 428 including its application to the Edgewater
7 Generating Station. Second, I will discuss the scenarios that WPL examined
8 related to installing controls at the Edgewater Generating Station. Finally, I will
9 review other current, proposed and anticipated federal and state air emission
10 regulations that support the need for this project.

11 **Q. Why is this project necessary?**

12 A. Because Sheboygan County is designated an ozone non-attainment area, the
13 Edgewater Generating Station must contribute to improving air quality in the area
14 by complying with RACT requirements. Installing Selective Catalytic Reduction
15 (SCR) on Edgewater Unit 5 to reduce NOx emissions will support the unit, and
16 the Edgewater Generating Station as a whole, in complying with RACT. This
17 project also supports compliance with other current, proposed and anticipated
18 federal and state air emission regulations.

19 **Q. What are the specific NOx emission levels that the units at the Edgewater**
20 **Generating Station must meet to comply with RACT requirements?**

21 A. The RACT requirements impose NOx emission rate limits (in #/MMBTU) on
22 each of the generating units at the Edgewater Generating Station. The NOx
23 emission rate limits are imposed in two phases. Phase 1 emission rate limits

1 became effective on May 1, 2009. Phase 2 emission rate limits become effective
2 on May 1, 2013. Phase 1 emission rate limits for Edgewater Unit 3, Edgewater
3 Unit 4 and Edgewater Unit 5 are 0.20, 0.15 and 0.15 #/MMBTU, respectively. In
4 Phase 2, the limits for Edgewater Unit 3, Edgewater Unit 4 and Edgewater Unit 5
5 drop to 0.15, 0.10 and 0.10 #/MMBTU, respectively. Each unit must achieve its
6 NOx emission rate limit (in #/MMBTU) on a 30-day rolling average basis.

7 **Q. Can emission allowances be used to comply with RACT requirements?**

8 A. No. Unlike other rules and regulations based upon a cap-and-trade program
9 model such as the Acid Rain Program and the Clean Air Interstate Rule (CAIR),
10 RACT does not permit the use of emission allowances for compliance. Under a
11 cap-and-trade program, emission allowances are typically purchased, sold and
12 traded using a market-based approach. In contrast, RACT requirements impose
13 the need to reduce NOx emissions at specific units or, using an alternative
14 compliance method or approach, at a group of specific units or facilities to
15 support attainment of the ozone national ambient air quality standard (NAAQS) in
16 specific counties or regions.

17 **Q. What are the alternative compliance methods or approaches for complying**
18 **with RACT requirements?**

19 A. There are two alternative compliance methods or approaches for complying with
20 RACT requirements identified in NR 428: facility averaging and multi-facility
21 averaging.

22 **Q. What is facility averaging and what compliance requirements are associated**
23 **with it?**

1 A. Facility averaging allows an owner or operator to average emissions from units at
2 one facility instead of complying on a unit-by-unit basis. Under a facility
3 averaging approach, the owner or operator demonstrates compliance by meeting,
4 on an annual and ozone season (May – September) basis, an aggregate NOx
5 emission rate limit (in #/MMBTU). The aggregate NOx emission rate limit is
6 established by summing the product of each unit's actual heat input (HI) and
7 emission rate limit (in #/MMBTU) (EL) and dividing it by the sum of the actual
8 heat input for all units. This aggregate NOx emission rate limit, calculated for the
9 applicable period, is compared with the corresponding aggregate NOx emission
10 rate. As an example, assuming a two unit facility that includes Unit 1 and Unit 2,
11 the aggregate NOx emission rate limit is equal to:

$$12 \quad (\text{Unit 1 HI} * \text{Unit 1 EL} + \text{Unit 2 HI} * \text{Unit 2 EL}) / (\text{Unit 1 HI} + \text{Unit 2 HI})$$

13 The aggregate NOx emission rate is established by summing the total quantity
14 (mass) of emissions (EM) from all units and dividing it by the sum of the actual
15 heat input for all units. For the two unit facility assumed previously, the
16 aggregate NOx emission rate is equal to:

$$17 \quad (\text{Unit 1 EM} + \text{Unit 2 EM}) / (\text{Unit 1 HI} + \text{Unit 2 HI})$$

18 Under a facility averaging approach, the owner or operator is also subject to a cap
19 on the quantity (mass) of emissions coming from all units contributing to the
20 facility average. This additional requirement to meet the emissions cap is
21 effective beginning in 2013.

22 **Q. What is multi-facility averaging and what compliance requirements are**
23 **associated with it?**

1 A. Multi-facility averaging allows an owner or operator to average emissions from
2 units at multiple facilities instead of complying on a single facility or unit-by-unit
3 basis. Under a multi-facility averaging approach, the owner or operator also
4 demonstrates compliance by meeting an aggregate NOx emission rate limit (in
5 #/MMBTU), on an annual and ozone season (May – September) basis, calculated
6 in the same manner as under the facility averaging approach with the exception
7 that, beginning in 2013, the aggregate NOx emission rate limit is reduced by 10%.
8 While this reduction in the aggregate NOx emission rate limit is imposed under
9 the multi-facility averaging approach, the emissions cap employed in the facility
10 averaging approach is not.

11 **Q. How is the RACT compliance method or approach determined for the**
12 **Edgewater Generating Station?**

13 A. Each year, by October 1, the owner or operator can submit a notification of use of
14 either a facility or multi-facility emissions averaging plan to the Wisconsin
15 Department of Natural Resources (WDNR) for the upcoming year. If a
16 notification is not submitted, the owner or operator must demonstrate compliance
17 on a unit-by-unit basis. Thus, the compliance method or approach can change
18 from year to year.

19 **Q. How could a facility averaging approach be used at the Edgewater**
20 **Generating Station?**

21 A. Edgewater Generating Station consists of three units with each unit owned by one
22 or more of three different owners. This provides numerous different groupings of
23 units (broken down into unit ownership share) that could be defined as a facility

1 for purposes of using a facility averaging approach to comply with RACT
2 requirements. For 2009 and 2010, WPL submitted facility averaging plans to the
3 WDNR that defined the facility as Edgewater Unit 3 (owned by WPL – 100%),
4 Edgewater Unit 4 (owned by WPL – 68.2%; Wisconsin Public Service
5 Corporation (WPS) – 31.8%) and WPL’s 75% ownership share of Edgewater
6 Unit 5.

7 **Q. Would the installation of SCR on Edgewater Unit 5 support RACT**
8 **compliance regardless of whether the unit-by-unit or facility averaging**
9 **approach is chosen?**

10 A. Based upon the modeling assumptions used, yes, it would. If a unit-by-unit
11 compliance approach is used, Edgewater Unit 5 must meet a Phase 2 emission
12 rate limit of 0.10 #/MMBTU. Edgewater Unit 5 cannot meet the lower Phase 2
13 limit, which it must do beginning in 2013, without significant additional NOx
14 emission reductions such as those provided by SCR. If a facility averaging
15 approach is chosen, installation of SCR on Edgewater Unit 5 provides sufficient
16 NOx emission reductions for the facility to meet its RACT requirements as well.

17 **Q. What modeling assumptions impact whether or not this project, under a**
18 **facility averaging approach, enables the facility to meet its RACT**
19 **requirements?**

20 A. The realized performance of the installed controls at each of the three Edgewater
21 units as well as whether or not WEPCO’s ownership share of Edgewater Unit 5 is
22 included as a part of the facility definition for RACT compliance purposes may
23 impact whether or not the installation of the Edgewater Unit 5 SCR will enable

1 the facility to meet its RACT requirements. Based upon the expected compliance
2 margin, the uncertainty in realized control performance may be large enough to
3 necessitate additional controls or other operating changes at the facility to
4 consistently meet the RACT requirements.

5 **Q. How does WPL define compliance margin as calculated in Table 4?**

6 A. In Table 4 of the Application (Exhibit 1), WPL calculates a compliance margin to
7 quantify the extent to which the facility meets RACT requirements.
8 Mathematically, it is equal to the NO_x emission rate difference (the aggregate
9 NO_x emission rate limit (in #/MMBTU) less the aggregate NO_x emission rate (in
10 #/MMBTU)) divided by the aggregate NO_x emission rate limit (in #/MMBTU).

11 **Q. Why is a compliance margin important?**

12 A. Compliance margin is important to insure that the units, or the facility in
13 aggregate, can maintain compliance under varying operational conditions it
14 experiences over time. A larger compliance margin corresponds to a greater
15 likelihood that the facility can consistently maintain compliance over each ozone
16 season and annual period for which compliance demonstration is required
17 assuming the facility averaging approach is used.

18 **Q. How large of a compliance margin is sufficient?**

19 A. It is difficult to define a single value for a compliance margin that is large enough
20 to insure that the facility can maintain compliance under varying operational
21 conditions it experiences over time. Numerous attributes including the variability
22 in the performance of installed controls, unit availability and dispatch, and

1 definition of the facility used to demonstrate RACT compliance all potentially
2 dictate how large of a compliance margin is needed.

3 **Q. Please generally describe the scenarios for installing controls at the**
4 **Edgewater Generating Station that were analyzed by WPL and are outlined**
5 **in Table 4 of the Application (Exhibit 1).**

6 A. The scenarios for installing controls at the Edgewater Generating Station that
7 WPL examined include:

8 Scenario 1 – current and approved operation

9 Scenario 2 – SCR installed on Edgewater Unit 5 (proposed project)

10 Scenario 3 – SCR installed on Edgewater Unit 4

11 Scenario 1, current and approved operation, features operation of
12 previously installed controls at the units including Selective Non-Catalytic
13 Reduction (SNCR) and Rich Reagent Injection (RRI) systems at Edgewater Units
14 3 and 4 and a Separated Over-Fire Air (SOFA) system at Edgewater Unit 5. WPL
15 anticipates current and approved operation of the units including the use of these
16 controls will enable the facility to meet its Phase 1 RACT requirements.

17 However, as illustrated in Table 4 of the Application (Exhibit 1), continued
18 operation in this manner will not enable the facility to meet its Phase 2 RACT
19 requirements beginning in 2013.

20 Scenario 2 features the installation of a SCR system on Edgewater Unit 5,
21 the proposed project in this Application, as well as the continued operation of the
22 SNCR and RRI systems at Edgewater Units 3 and 4. With the addition of the
23 SCR system on Edgewater Unit 5, the facility will be capable of meeting its Phase

1 2 RACT requirement beginning in 2013 with a compliance margin (assuming
2 Edgewater Unit 5 in its entirety is included in the facility definition) of
3 approximately 10%. The addition of the SCR system on Edgewater Unit 5 would
4 also enable it to meet its single unit Phase 2 RACT requirement.

5 Scenario 3 features the installation of a SCR system on Edgewater Unit 4
6 as well as the continued operation of the SNCR and RRI system on Edgewater
7 Unit 3 and the SOFA system on Edgewater Unit 5. Unlike with the addition of
8 the SCR system on Edgewater Unit 5, the analysis indicates that the addition of
9 the SCR system on Edgewater Unit 4 would not provide sufficient NO_x emission
10 reductions to enable the facility to meet its Phase 2 RACT requirement. This is
11 primarily due to the lower pre-SCR NO_x emission rate of Edgewater Unit 4 as
12 well as its smaller size as compared to those of Edgewater Unit 5. However, the
13 addition of the SCR system on Edgewater Unit 4 would enable it to meet its
14 single unit Phase 2 RACT requirement.

15 **Q. Why did WPL examine these scenarios for installing controls at the**
16 **Edgewater Generating Station and what did WPL conclude?**

17 A. First, WPL wanted to demonstrate that continued current operation, including the
18 use of the recently installed SNCR and RRI systems at Edgewater Units 3 and 4,
19 although capable of meeting the Phase 1 RACT requirement, was incapable of
20 meeting the Phase 2 RACT requirement. WPL concluded some additional change
21 to facility emissions is needed. Second, WPL wanted to examine potential
22 projects that could most likely fulfill several objectives it used in its RACT
23 compliance planning: a) support the potential use of a Phase 2 facility-wide

1 RACT compliance approach and b) reduce NOx emissions to required levels,
2 from both a unit and facility perspective, in a cost effective manner. Finally,
3 WPL wanted to demonstrate that an alternative, potentially competing project to
4 the addition of a SCR system on Edgewater Unit 5, the addition of a SCR system
5 on Edgewater Unit 4, does not fulfill at least one of the RACT compliance
6 planning objectives. WPL concluded that, unlike the addition of a SCR system on
7 Edgewater Unit 5, an Edgewater Unit 4 SCR system is not capable, by itself, of
8 supporting the potential use of a Phase 2 facility-wide RACT compliance
9 approach.

10 **Q. Are other scenarios feasible that do not include the installation of SCR on**
11 **Edgewater Unit 5?**

12 A. WPL believes that, without significantly altering Edgewater Unit 5's current
13 operation (such as through retirement, fuel switching to natural gas, or re-
14 powering), SCR is the only commercially available NOx emissions control
15 technology that will reduce Unit 5 NOx emissions in large enough quantities to
16 comply with Phase 2 RACT requirements on a unit-specific basis and allow for
17 the possibility of compliance with Phase 2 RACT requirements on a facility-wide
18 basis without installing additional emission controls on Edgewater Units 3 or 4.
19 Another scenario that does not include the installation of SCR on Edgewater Unit
20 5, the installation of SCR on Edgewater Unit 4 and the installation of a SNCR
21 system on Edgewater Unit 5, is feasible only if a facility-wide compliance
22 approach is used. In this scenario, Edgewater Unit 5, on a stand-alone basis,
23 would not comply with Phase 2 RACT requirements.

1 **Q. With what other current, proposed and anticipated federal and state air**
2 **emission regulations does this project support compliance?**

3 A. This project supports compliance with other current air emission regulations
4 including the Clean Air Interstate Rule (CAIR). It also may support compliance
5 with proposed and anticipated air emission regulations including changes to
6 CAIR and revisions to the ozone NAAQS.

7 **Q. What emission limits are imposed by CAIR?**

8 A. The final CAIR was issued by the United States Environmental Protection
9 Agency (EPA) in March 2005, and requires WPL and other electric utilities to
10 reduce SO₂ and NO_x emissions from existing and new electric generating units
11 with greater than 25 MW of capacity. CAIR is a cap-and-trade market-based
12 program under which electric generating units are allocated sulfur dioxide (SO₂)
13 and NO_x allowances. Compliance with CAIR occurs in two phases. CAIR's
14 Phase 1 NO_x emission requirements began on January 1, 2009, and Phase 1 SO₂
15 emission requirements are effective on January 1, 2010. CAIR's Phase 2
16 requirements begin on January 1, 2015 for both SO₂ and NO_x emissions. When
17 fully implemented, CAIR is expected to reduce overall SO₂ and NO_x emissions
18 from nationwide 2003 levels by more than 70% and 60% respectively. Each state
19 may promulgate regulations, subject to EPA approval, to implement CAIR.
20 Wisconsin has adopted state-specific regulations regarding the allocation of NO_x
21 allowances under CAIR and has received final EPA approval of these regulations.
22 For the allocation of SO₂ allowances and other key aspects of implementing

1 CAIR, Wisconsin has not promulgated separate state rules and plans to follow the
2 EPA's federal rules.

3 **Q. What is the impact of the 2008 rulings by the United States Court of Appeals**
4 **for the District of Columbia Circuit ("Court") on CAIR?**

5 A. On July 11, 2008, the Court found that CAIR was fundamentally flawed, and
6 issued an opinion stating that, as a remedy, the rule should be vacated in its
7 entirety. However, at that time, the Court did not issue the mandate for the
8 vacatur. On December 23, 2008, the Court modified the remedy and remanded
9 CAIR, without vacatur, to the EPA to modify the rule consistent with the Court's
10 July 11, 2008 decision, thereby preserving CAIR in its entirety. In May 2009,
11 EPA presented a semiannual regulatory agenda that included the scheduled
12 proposal of a rule replacing CAIR in May 2010.

13 **Q. What impact do changes to CAIR have on this project?**

14 A. WPL believes that changes to CAIR will likely strengthen the need for this
15 project. While the NOx emission reductions resulting from the installation of the
16 SCR system on Edgewater Unit 5 support compliance with CAIR NOx emission
17 requirements as they currently exist, these NOx emission reductions, because of
18 their magnitude and timing, will also likely support compliance with a future rule
19 replacing CAIR. Installing the SCR system supports continued operation of
20 Edgewater Unit 5 in the event that a future rule replacing CAIR eliminates or
21 significantly restricts the use of NOx emission allowances as a means to satisfy
22 CAIR NOx emission reduction requirements. Notwithstanding the CAIR as
23 currently written or the potential changes to CAIR, this project is needed to

1 comply with the RACT requirements by reducing NOx emissions at the
2 Edgewater Generating Station.

3 **Q. What is the current status of the ozone NAAQS?**

4 A. In March 2008, the EPA announced reductions in the primary NAAQS for 8-
5 hour ozone to a level of 0.075 parts per million (ppm) from the previous standard,
6 established in 1997, of 0.08 ppm. On March 12, 2009, Wisconsin Governor Jim
7 Doyle submitted a letter to the EPA recommending that all of the counties in
8 Wisconsin be designated as in attainment with the EPA's new 0.075 ppm ozone
9 standard. In September 2009, the EPA announced that it will officially reconsider
10 the ozone standard rulemaking that it issued in 2008. The EPA will also propose
11 to stay the 2008 standards for the purpose of attainment and non-attainment area
12 designations. EPA will propose any revisions to the ozone standards by
13 December 2009 and will issue a final decision by August 2010.

14 **Q. How may this project support meeting the new ozone NAAQS?**

15 A. While ozone is not directly emitted from the Edgewater Generating Station, it is
16 formed from the photochemical reaction of certain emissions, including NOx, in
17 the atmosphere. The project proposed in this Application will significantly
18 reduce NOx emissions from Edgewater Unit 5. This, in turn, will likely result in
19 decreased ozone formation. If the EPA designates any counties in Wisconsin as
20 non-attainment areas with regard to the new ozone NAAQS or determines that
21 emissions sources in Wisconsin significantly contribute to non-attainment areas
22 outside of the state, the WDNR will be required to develop and submit a state
23 implementation plan (SIP). A SIP documents the collection of regulations the

1 state plans to use to insure the NAAQS is met. It may include mandates for
2 additional NOx emission controls and more stringent NOx emission limitations.
3 The magnitude and timing of the NOx emission reductions resulting from this
4 project may support the SIP and hence attainment of this new, more stringent
5 ozone NAAQS. Even if the new ozone NAAQS does not cause any non-
6 attainment areas of relevance to be designated, the NOx emission reductions
7 resulting from this project will still support or promote on-going continued
8 attainment of the ozone NAAQS.

9 **Q. Can you summarize the various federal and state air emission regulations**
10 **with which installing SCR on Edgewater Unit 5 will help WPL achieve**
11 **compliance?**

12 A. Yes. Installing SCR on Edgewater Unit 5 will reduce NOx emissions from the
13 unit, allowing the unit and, most likely, the facility, to achieve compliance with
14 RACT Phase 2 requirements which become effective in May 2013. This project
15 supports compliance with other current air emission regulations including the
16 CAIR and may also support compliance with proposed and anticipated air
17 emission regulations including forthcoming changes to the CAIR and revisions to
18 the ozone NAAQS.

19 **Q. Does this conclude your pre-filed direct testimony?**

20 A. Yes, it does.